M/035/002

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Frederick D. Fox
Director, Environmental Affairs

Kennecott

March 2, 1994

Mr. Wayne Hedberg, Permit Supervisor
State of Utah Department of Natural Resources
Division of Oil, Gas, and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

Dear Mr. Hedberg:

Enclosed is the Kennecott Utah Copper proposal for the Land Application of Municipal Biosolids. Our objective is to proceed with the application of biosolids on the Tailings Impoundment this spring. Your assistance in providing a timely review and response is appreciated.

Thank you for your attention to this matter. If you have any questions or additional information is required, please give me a call.

Sincerely,

Frederick D. Fox
Director, Environmental Affairs

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DD:dmd

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Proposed Demonstration Project for the Land Application of Municipal Biosolids

Submitted to the Division of Water Quality and the Division of Oil, Gas and Mining by Kennecott Utah Copper Corporation

Introduction

The Environmental Protection Agency published the final rules for the disposal of municipal sewage sludge on February 19, 1993 in the Federal Register, 40 CFR Parts 257, 403, and 503. These regulations were promulgated under authority of Sections 405(d) and (e) of the Clean Water Act, as amended. One circumstance of the regulations that has direct application to the needs of Kennecott Utah Copper (KUC) is the application of sewage sludge to the land for a beneficial use (as biosolids), i.e., for land reclamation.

Specifically KUC proposes to use anaerobically digested (Class B) sewage sludge from the Central Valley Water Reclamation Facility (CVWRF) as a soil amendment to enhance reclamation at selected locations on KUC property. Thus, KUC requests approval for a demonstration project for the land application of biosolids as outlined in this proposal. The requested length of the demonstration project is for 10 years. KUC will evaluate the progress of the demonstration project at suitable intervals. The proposed date of first application will be the first available opportunity after State approval, consistent with the application requirements of Section 503. Ideally, the date of first application will be prior to the 1994 spring seeding season.

This proposal will initially focus on the tailings impoundment slopes and stepback areas as given by the attached location and site maps (Figs. 1 and 2). This proposal follows the guidelines prepared and distributed by the Division of Water Quality so as to be in compliance with 40 CFR 503 regulations concerned with the land application of biosolids.

Purpose

The purpose of the demonstration project, during this initial phase, is to determine the comparative success of vegetative growth with the application of biosolids to the relatively flat slopes of the Tailings Impoundment. Further, by soil tests at the site, the project will monitor the potential movement of the ten elements listed in Tables 1 through 4 of Section 503.13 as well as for listed pathogens and nitrogen as nitrate and nitrite. Additional analysis results as required by the State of Utah will be provided by CVWRF for approval prior to shipment to the tailings impoundment site. Since the sludge will be incorporated into the soil within eight hours, the VAR requirements will be satisfied by vector option 10.

Description of the Site

The tailings impoundment site, as shown on Figures 1 and 2, is owned by KUC. The property is fenced and locked from public access. The distance from the nearest dwelling is one-half mile.

The distance from the nearest drinking water well is one-quarter mile. The depth to the first major aquifer is 200 feet. The site is within the boundaries of UPDES permit No. UT0000051. Please refer to the UPDES permit and the Tailings Impoundment Groundwater Protection Permit application for specific technical information.

The slopes of the test cells at the site will vary from essentially flat up to a maximum of 7 horizontal to 1 vertical.

Work Plan

Treatments: Two treatments will be conducted. Prior to treatment, each test cell will be scarified on the contour to a depth of six to 12 inches. Each treatment will use the same seed mix (Table 1) and the same standard mulching practice as followed by KUC in the past. The standard seeding and mulching practice consists of:

(1) application of fertilizer[1] and rye cereal cover crop in the first year for stability, and

(2) in the following year, application of a perennial seed mix which is applied with a standard rangeland drill seeder, followed by a hydro-application of fertilizer, tacifier, and mulch. The test cells will not be irrigated.

[1] No fertilizer will be applied initially in this demonstration project. Fertilizer application will be evaluated by KUC after comparison of the test cells with the control cells.

Controls: Existing sections of the Tailings Impoundment, that have had past land reclamation treatments conducted by KUC, will be utilized as treatment control cells. Additional sampling will be conducted in the adjacent control cells to provide comparison with the treatment cells.

The two biosolid treatments at the tailings impoundment sites will be conducted as follows:

(1) Biosolids application with no additional amendment. The biosolids will be disced six to 12 inches into the soil, followed by the standard seeding and mulching practice. There will be no fertilizer application.

(2) Biosolids application followed by application of a green waste-biosolids co-compost mixed in a ratio of 2:1. The co-compost will be obtained from the Salt Lake City/County landfill and CVWRF and prepared to Section 503 specifications. The co-compost will be disced six to 12 inches into the soil, followed by the standard seeding practice. There will be no mulch or fertilizer application.

Two application rates will be studied in the demonstration project. (1) An agronomic rate will be applied based on the calculated usage of nitrogen by the plant species in the proposed seed mix, and (2) a cumulative loading rate will be determined and applied based on specific analytical results and Table 2 limits of Section 503.13. The number of biosolids and biosolids-compost applications will be determined based on evaluation of demonstration project results. Each test cell will receive both application rates.

Test Cell Locations (Figure 2):

(1) Test cell SW Site W-2/W-3: south-facing, essentially flat slope, 15 acres. This test cell will be subjected to drying conditions typical of a south-facing slope. The eastern half of this test cell, which will include another 15 acres, is reserved for the testing of cyclone tailings.

(2) Test cell NW site W-6: northwest-facing, range of 7 to 8h to 1v slope, 32 acres. This test cell is subjected to extreme drying conditions from persistent winds. This test cell already includes rows of trees. The adjacent control cell also includes trees.

(3) Test cell North Site E-9/E-10: north-facing, range of 7 to 8h to 1v slope, 25.5 acres. This test cell will include tailings that have been recently deposited.

(4) Test cell SSE Site E-4/E-5: south to east-facing, 20h to 1v slope, 12 acres. This test cell has been planted previously with a cover crop and re-disturbed by construction activities.

(5) Test cell South Site E-1: south-facing, range of 10 to 20h to 1v slope, 3 acres. This test cell will consist primarily of recently deposited, cyclone separated course fraction tailings.

Site Monitoring

Soil and Biosolids: Prior to the application of the soil treatments, the following tests will be conducted on one composite soil sample for every five acres from each test cell and for the biosolids-bearing materials: (1) Ph, (2) SAR, (3) EC, (4) nitrogen as nitrate and nitrite, (5) water holding capacity, (6) CEC, (7) acid-base analysis, (8) organic matter content, (9) soil texture, (10) phosphorus, (11) DTPA extractable metals (Fe, Zn, Cu, Mn, Cd, Pb, Ni, Cr), (12) saturation extractable metals (Ca, Na, Mg), (13) carbon to nitrogen ratio (C:N), and (14) tests for As, Hg, Mo, and Se. The composite sample will be composed of 4 to 8 grab samples of 0 to 12 inch depths. The sample will be split into three parts, one of which will be saved, one will be tested by the KUC laboratory, and one will be tested by an independent laboratory.

In addition, CVWRF will perform the necessary tests to certify pollutant concentrations, pathogen densities, derivation of pathogen class, and the method used to meet vector attraction reduction requirements for its sludge.

After treatment, these tests will be repeated quarterly for the first year at depths of 1, 2, 3, 4, and 5 feet, from a down-slope location, at each test cell. An evaluation of the effectiveness of this test program will then be conducted. Based on the evaluation, unnecessary tests will be dropped from the demonstration project. Thereafter, soil tests will be performed annually.

Vegetation Establishment: Vegetation success will be measured based on comparison with the control cells as a function of biomass production and species diversity as measured by transect. Each of the test cells will be divided into a two-dimensional grid with 5-acre quadrats that will be used as reference for both types of measurements. The biomass measurement and species identification will be covered in randomly selected quadrats as defined by the grid. With each selected quadrat, vegetation will be identified, harvested, and bagged by individual species. The collected species will then be dried and weighed to obtain total above-ground biomass and species-weighted biomass results. Species diversity will be calculated directly from the field notes and sample collection.

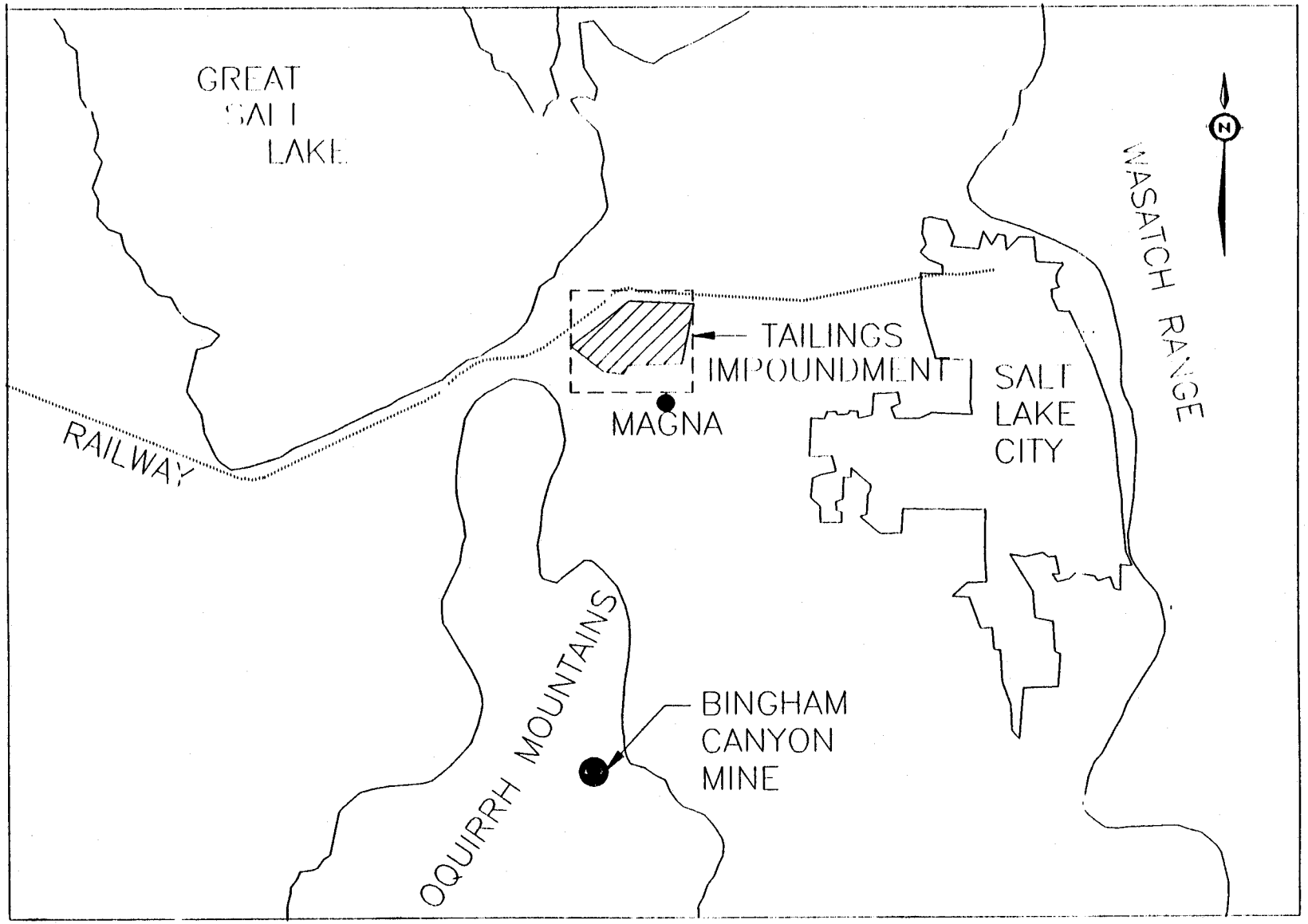
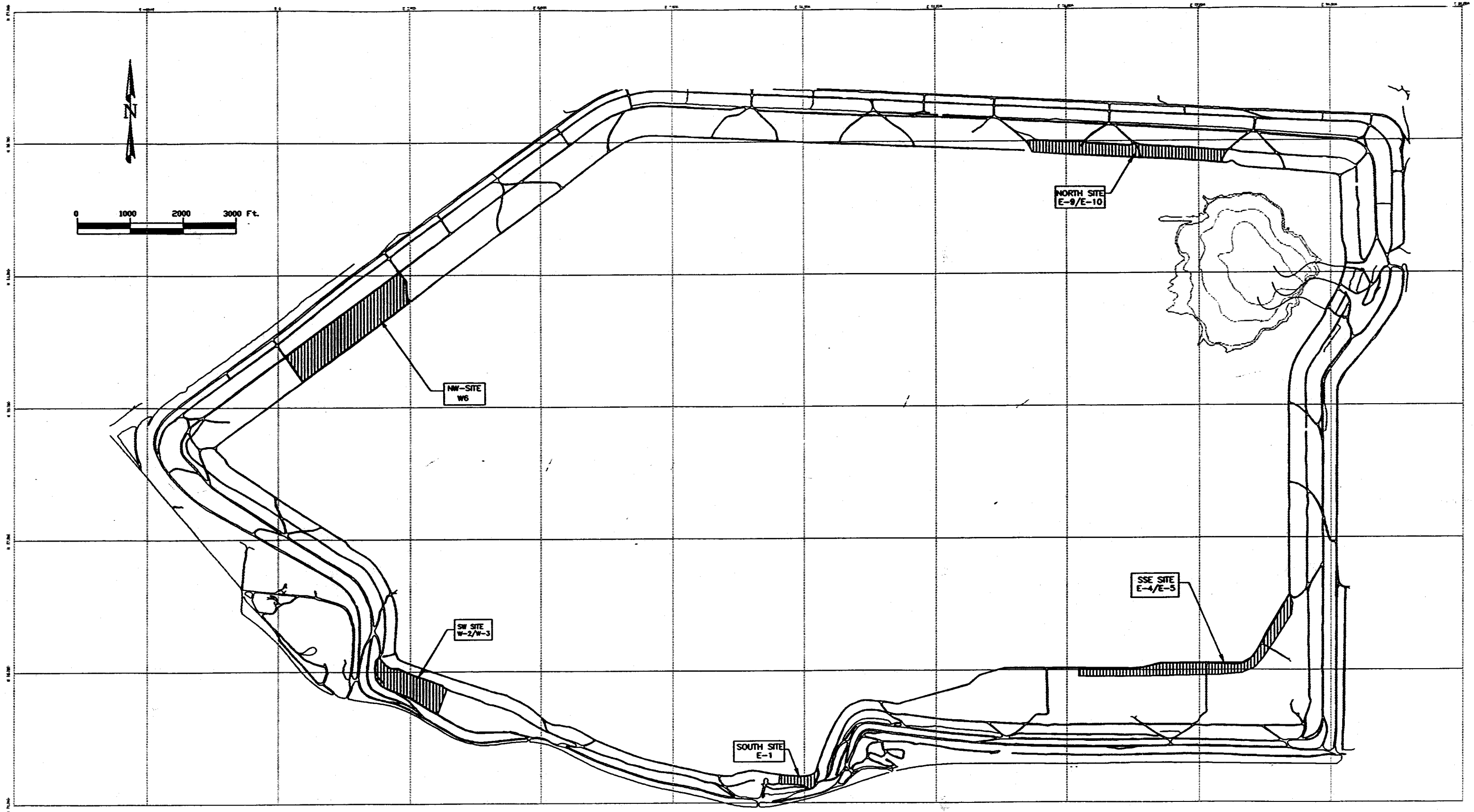


FIGURE 1
VICINITY MAP



NO.	REVISIONS	BY	DATE

DRAWN _____ DATE CHECKED _____ DATE

DESIGNED _____ DATE _____ PROJECT ENGINEER

APPROVED _____ DATE _____ PROJECT MANAGER

DEMOSTRATION SITES

SW SITE — SITE DESIGNATION

KENNECOTT UTAH COPPER

MAGNA, UTAH

FIGURE 2

SITE LOCATION MAP

LAND APPLICATION OF MUNICIPAL SEWAGE SLUDGE